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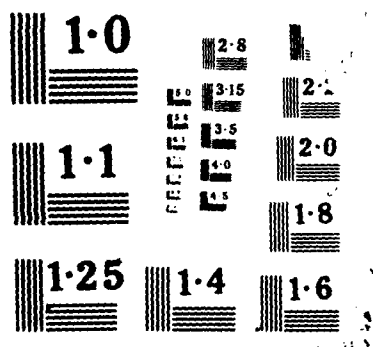
SIZE EFFECTS IN THE ELECTRICAL RESISTIVITY OF
BENZENE-DERIVED CARBON FIBRE. (U) MASSACHUSETTS INST OF
TECH CAMBRIDGE M S DRESSSELHAUS ET AL. 30 OCT 87

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<p>Tahar and others in the Dresselhaus group previously reported a size effect in the electrical resistivity of benzene-derived carbon fibers with small diameters. A simple theory theory indicates that the resistivity has a linear dependence on the reciprocal diameter associated with boundary scattering together with a constant term due to a size-independent scattering process. The observed results are well represented by this relation if the diameter is large enough, while for samples with small diameter, the observed resistivity data are considerably smaller than the theoretical expectation. This discrepancy is removed by considering the correct boundary conditions and by solving the Boltzmann equation.</p>			
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CS 4 Size Effect in the Electrical Resistivity of Benzene-derived Carbon Fibers*. K. Sugihara and M.S. Dresselhaus, M.I.T.--Tahar et al. previously reported a size effect in the electrical resistivity of benzene-derived carbon fibers (BDF) with small diameters.¹ A simple theory indicates that the resistivity obeys an expression $\rho = a + b/d$, where a denotes a size-independent scattering process and the second term corresponds to boundary scattering where d is the sample diameter. The observed results are well represented by this formula if d is large enough, while for samples with small d , the observed resistivity data are considerably smaller than the theoretical expectation. This discrepancy is removed by considering the correct boundary conditions and by solving the Boltzmann equation. On the other hand, the conventional formula $1/\tau = 1/\tau_0 + v/L$, where the second term is associated with boundary scattering, is not applicable if $L < l_0$ (l_0 = mean free path associated with $1/\tau_0$).

*Supported by AFOSR contract F49620-85-C-0147

¹ M.Z. Tahar, O.C. de Hodgins, M.S. Dresselhaus, and M. Endo, Extended Abstracts of the Symposium on Inter-calated Graphite, Materials Research Society Meeting, Boston (1984), p. 217.

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